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Helmet-Less Bike Rider Detection and Extracting the Bike Number using Deep Learning

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Abstract: Now a days motorbike injury are growing daily in all of the countries, as there are one-of-a-kind sort of transportations. Motorcycle is one in every of foremost transportation utilized by the human beings for touring shorter distances. Wearing helmet is the primary protection degree for motorcyclists. foremost difficulty for inflicting an twist of fate isn't carrying helmet, this could now no longer be accompanied with the aid of using all drivers. Accident of a motorcyclist is critical difficulty. Our venture targets to save you the injuries with the aid of using routinely figuring out the drivers carrying helmet or now no longer. If driving force does now no longer put on helmet car wide variety could be extracted from pix of registration code. For this, MOBILENET descriptor used for capabilities extraction and optical character recognition (OCR) individual popularity is used for extraction of textual content from registration code image. For this utility enter is taken as movies from webcam or CCTV. This venture is probably used for e-challan era system.

***Key Words*: OCR, Applications of Deep Learning, Helmet Detection, Mobile Net, SSD.**

1.INTRODUCTION

In recent days technology has increased expeditiously, more people are inspired and focusing on Machine learning technologies. Helmet detection and license plate extraction plays a major role in License plate detection. Over the years traffic systems are not implemented through computer observation algorithms. The research is about identifying helmet detection and Optical character recognition through machine learning algorithms like MOBILENET, YOLOv3, CNN and OCR. So these algorithms help to analyze the target in an efficient way. The results of the study shows that the prediction of object detection is early and accurate(Wang et al. 2021).

A total of 52 articles in IEEE,38 articles in science direct and 12 articles in google scholar have been published. (Yang, Li, and Duan 2018) proposes an automatic recognition technique with the help of kernel-based ELM classifier, So convolutional Neural Network that joins with KELM produces accurate results in less duration time. Where the memory occupancy rate is 80% and the model shows the accurate model accuracy of 91.6% in object detection effectively. (Xu, Li, and Yu, n.d.) This paper explains vehicle plate recognition (LPR) through Sobel edge detector and Neural Network color classifier, mainly concrete on the edge map is retrieved through the sobel edge detector. Where the proposed system is impartially dependable on the small targets and results and false outputs. (Islam and Rasel 2019) proposes the image detection using SSD and RCNN, The proposed methodology generates the 0.7% loss value and 100% precision value on retrieving the image elements on number plate and it generates the 91.56% precision for identifying the image labels on the number plate. (Dias, Jagetiya, and Chaurasia 2019) proposes Tesseract OCR for the license plate recognition, with these recognition we can easily recognize the number plate in an effective manner and train the model by using Faster RCNN results and accurate output. For training the number plate identification loss value is 0.011 and optimal learning rate is 0.002. In this light power on the license plate for identification of character is difficult, In future OCR helps the light intensity increase on the number plate for character recognition this paper explains about the real time segmentation results in OCR and an accuracy of 99.3% compared to past works, where the algorithm follows these steps for number plate recognition are license plate replacement, plate extraction and segmentation and license plate recognition. Where the data is concatenated and up-sampling takes place with a convolutional set. (Liu and Luo 2010) this paper explains about VLP extraction from an VLP image with the help of sobel operator and image enhancement technique, With the help of detection in horizontal and vertical boundaries to mix up with VLP part. So this paper output shows that VLP number shows the results very accurately and productively in the worst case scenario from VLP images and transforms the color enhancement with image calibration and shrinking labels. (Li, n.d.) proposes a two-stage approach for image detection with the help of convolutional neural network, with the help of this approach increases the clarity in the image recognition and increases the accuracy. The model accuracy is 98.32% in number detection and 97.26% in character recognition, so this model shows high accuracy and performance in comparison to old methods.

Based on the observation of the above literature survey, the accuracy and the prediction efficiency of the helmet detection and license plate extraction is less in the R-CNN algorithm. So focusing on this, the proposed workis used for better accuracy and precision.

2. LITERATURE SURVEY

In [1] author specified as, this paper is designed to predict the safety percentage of helmet. It is measured based on color of hat. We use k-means clustering for grouping of hats, yolov3 for object detection and densenet convolution neural networks. In this clustering is performed for hats. The whole densenet network composes of 53 convolutional layers with shortcut connections. The result percentage may be depending on the place that person stands. This project is majorly used in construction sites for safety of workers, so automatically we can protect them from dangerous attacks.

In [2] author specified as, this paper is designed to determine half helmet and full helmet detection, Using Haar classifier face detection is performed if the face is not found then it is full helmet. If not found circle hough transform technique is used for classifying half helmet or no helmet. This application got an accuracy of 95%. The major problem of this application it doesn't consider motor bike, it directly checks whether helmet is detected or not.

In [3] author specified as, to determine the bike rider with and without helmet. In this model accuracy comparison is done between the four algorithms those are VGG16, VGG19, Inceptionv3 and mobileNet. Among these algorithms mobileNet has highest accuracy with 85.19%. In this paper both classification and segmentation are done using SSD. Accuracy of VGG16 is 78.09%, VGG19 is 79.11% and inceptionv3 is 84.58%.

In [4] author specified as, this paper shows the comparison between the yolov3 and optimization methodologies. These done for both mAP and fps. The optimization method has detected with high accuracy and satisfies the application. If the person is not wearing helmet, then warning is sent to the supervisor.

In [5] author specified as, this paper shows the helmet detection and license plate extraction of helmet less drivers. They have used technique such as fast R-CNN for feature extraction, KNN classifier used for classifying helmet and optical character recognition is used for extracting characters from license plate.

3. PROPOSED SYSTEM

In proposed system Automatic helmet detection and license plate extraction uses photos from a video or digital camera as input and produces license plate number as text for output. Fig 3.1 shows the procedure of implementing this application. Here the algorithm is implemented by using following steps

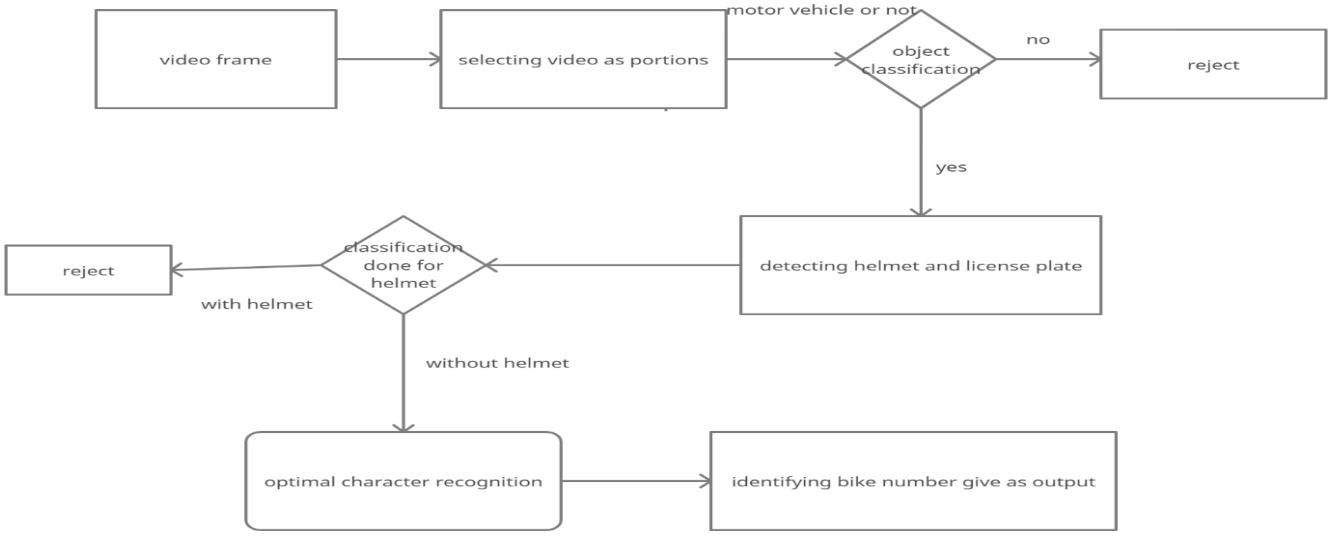

Fig 1 Block diagram of system

3.1 Image collection

In this research we will collect the images from videos or real-time. These videos are divided into frames for processing. For processing of images we use OpenCV, TensorFlow etc.

3.2 Feature extraction

Feature extraction is mainly used for building a model efficiently. By using feature extraction techniques results will be accurate and optimized. Mobilenet is a deep convolutional neural net algorithm this provides maximized accuracy and efficiency as output.

3.3 Object Detection

Object detection technique is used for detecting objects. In this research we are going to detect the objects such as motorcycle, person, helmet. Here objects are detected using algorithm single shot detector. These both object detection methods had produced accurate results.

3.4 Classification

For detecting the person wearing a helmet or not we have implemented classification algorithms. Based on the type of the classification algorithm, result accuracy depends. If we have done with advanced classifier, we get accurate results. We are using CNN classifier

3.5 Optical Character Recognition (OCR)

OCR is used for extracting characters from images. This algorithm is going to implement this after satisfying some conditions such as person sitting on a motorcycle and not wearing a helmet. By using google-cloud-vision, PILetc. Vehicle number will be displayed as text.

4. EXPERIMENTAL RESULTS

In this research the proposed algorithms are implemented through video and real-time modes. The object detection is performed. The detections are found with boxes, finally 3 boxes plotted for person, motorcycle and helmet. The number is retrieved by character recognition algorithm and are displayed in the terminal, OCR will identify the characters of the taken input image. The following are results after performing research.

```
>>>
 RESTART: C:\Users\Lenovo\Desktop\helmet-detection-main\m
orbike-helmet_numberplate.py
enter 1 for video and 2 for camera
1
[INFO] loading model...
Loading helmet model...
[INFO] starting video stream...
No helmet Number extracting...
AP37AR1274
....
```

Fig 2: Number plate detection using OCR

Fig 3: Person riding bike without helmet

Fig 4: Person riding a bike without helmet

5. CONCLUSION

From this research the results will be accurate. In this we have opted SSD object detection, it is well suited for identifying specific objects in videos, live feeds or images. In this we are going to train with MOBILENET on sample datasets, classify the data by using CNN and for extracting the characters and numbers we use OCR algorithm. By implementing all this output contain accurate results so automatic helmet detection will be implemented efficiently, this will reduce the burden of traffic police. In our project we are all open-source software and already many places CCTV are installed we can use videos from those, by this we can say that this application is flexible and cost-efficient.

6. FUTURE ENHANCEMENT

For the future work, we are proposing some technical and real-time aspects by which the system performance will be improved. As the technology updates day by day, there might be improved algorithms will develop in the future. By using those algorithms we will get more accuracy. There is also a need to collect more data to increase rider position and helmet detection accuracy for motorbikes with more than two riders. And also the video should be captured from the different positions to process the data in regard to the point of view. This would result in the reduction of detection inaccuracies caused by missed detections. In the future by improving this system we will be able to track a particular motorcycle by its registration number. We can also be able to monitor the traffic inflow and outflow for a particular city to the traffic in different times by collecting the data.

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